

A Systematic Approach to Assess the Quality of Centre-Based Care Services for Infants and Toddlers in Hong Kong

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Abstract

This study examines the quality of Hong Kong centre-based childcare services with the aim of identifying areas for further improvement. With the use of the Chinese version of the Infant/Toddler Environment Rating Scale-Revised (ITERS-R), the quality of the classrooms in nine non-profit centres located in different districts of Hong Kong was systematically assessed. The findings revealed the global quality of the childcare centres in Hong Kong and indicated the relative strengths and weaknesses of the specific areas of childcare services compared with findings from the international community. The results showed that the quality of centre-based care services for infants and toddlers in Hong Kong was minimal. Compared to other countries, the health and safety practice in Hong Kong scored higher. However, the scores were especially low in space and furnishings, listening and talking, activities and programme structure. These results revealed that Hong Kong faced challenges with the quality of its centre-based care services in general. It was also surprising to find a negative correlation between the quality of the childcare centres and the teachers' experience. The findings also indicated the importance of early childhood education training and continuous professional development.

Keywords: ITERS-R, centre-based, childcare, infants, toddlers, quality

Introduction

Childcare services in Hong Kong

Nowadays, childcare services in Hong Kong mainly target families that cannot provide proper care for their children at home. There are three major childcare providers in Hong Kong. One is home-based care provided by parents, one is centre-based care and the other is a volunteer-based care service subsidised by the government. In 2019, there are 26 non-profit and 18 private childcare centres, crèches and kindergarten-cum-childcare centres (collectively referred to as centres) in Hong Kong providing care services to infants and toddlers from birth to two years of age (Hong Kong Social Welfare Department, 2019). Most private centres only offer half-day services in the mode of 'play groups'. Regulation of the Hong Kong childcare infrastructure has been limited because there have been no quality indicators. Hong Kong Education Bureau and Social Welfare Department (2019) prescribes that the minimum floor area per person for infants and toddlers up to age two should be 2.8 square meters with a staff-child ratio of 1:8. It is also a basic requirement that children under two years of age who stay at a centre for more than four hours must be provided with a bed and bedding. These regulations apply to all centres in Hong Kong, with little variation among them. In a policy address delivered in Hong Kong in 2018, the planning ratio applicable to the provision of places at childcare centres was formulated, the level of subsidies was increased and an enhanced teacher-child ratio was suggested. However, there has been no research on the quality of centre-based care services for infants and toddlers (hereafter centre-based care services) in Hong Kong. Therefore, the purpose of this study is to fill in the gaps of knowledge related to the quality of centre-based care services in Hong Kong.

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Perspectives of quality in centre-based care services

The definition of childcare quality has generally been composed of two different parts: structural quality and process quality (Cárcamo et al., 2014). Structural quality includes more distal factors such as group size, teacher to child ratio and teachers' education. These factors may affect infants and toddlers in an indirect way. Process quality is also referred to as the quality of the teachers' process (Clarke-Stewart and Allhusen, 2005; Vandell, 2004) because the interactions between children and teachers is an important part. Process quality is measured by how children interact with teachers, peers and materials. According to Cryer et al. (1999), process quality encompasses 'the activities that are carried out to protect infants and toddlers' health and safety, and to encourage their positive physical, language, intellectual, emotional, and social development' (p.340). The most common scale used to measure process quality has been the Infant/Toddler Environment Rating Scale (ITERS). This scale can reflect various aspects of childcare for different routines and activities. Bjørnstad et al. (2012) suggested that understanding of the quality of centre-based care services has generally been inadequate. The lack of knowledge on this subject has manifested in the international literature, such as in studies conducted in Norway and other Nordic countries. There has also been an emerging argument over the difficulty of assessing quality at the classroom level (Hallam et al., 2009). The purpose of this study was to use the Infant/Toddler Environment Rating Scale-Revised (ITERS-R) to compare the quality of child care services in Hong Kong with other countries and to examine both the global quality and various aspects of process quality in Hong Kong centre-based care services.

The research hypotheses are as follows:

1. With the use of ITERS-R measurement, the quality of centre-based care services is comparable to those countries using the same measurement scale.
2. Process quality based on the direct interactions of teachers with infants and toddlers, and personal care for infants and toddlers is better than the quality related to the provision and furnishing of learning materials, equipment and space.
3. The global quality of infant and toddler care is positively associated with the teachers' qualifications. Specifically, we hypothesize that the higher the teachers' qualifications, the higher the quality of centre-based care services.

Measures

The ITERS-R instrument used in this study consists of a global scale that measures the overall quality of the classroom setting (Perlman et al., 2004). By offering indicators for structural and process quality that can be used to assess global quality in practice, policy and research, this rating scale has commonly been used to measure the quality of child care environments that cater to infants and toddlers under the age of 30 months. (Campbell and Milbourne, 2005; Harms et al., 2003; Burchinal et al., 2002; Phillips et al., 2000). The Chinese translated version of the ITERS-R was used as the tool in this study. The content and wording of this version adheres to what has been used in local early childhood education, so that teachers and researchers can easily use and understand it (Harms et al., 2014). The ITERS-R can provide a snapshot view of a setting's quality. To be more precise, the ITERS-R assesses the quality of a specific setting at a given time. Fenech et al. (2010) found the ITERS-R to be a good indicator of quality because it enables researchers to compare quality ratings over time, between urban and rural areas and between settings for infants and toddlers. Because this scale has been extensively used in the international context, researchers have been able to compare the childcare quality in an array of countries by making use of it (OECD, 2015; Ministry of Education and Research, 2016). The ITERS-R can be used for regular national quality assessments because the scale can evaluate the overall quality of child care environments from different perspectives, such as teacher-child interactions. Instead of basing the assessments on individual children, they focused on the entire setting. Therefore, the ITERS-R has been effective at comprehensively evaluating the quality of infants and toddlers' learning and developmental environments.

Research Methodology

Sample

Infants and toddlers aged zero to 24 months and the teachers in centre-based care services were the objects of this study. Nine centres were selected for observational assessment using a purposive sampling technique. The sample included families with diverse socio-economic status from different districts, and classrooms with variations in the teacher-child ratio, group size, types of services provided and the demographic characteristics of the children such as age, gender composition and home language.

Overall, this was a representative sample of centre-based care services in Hong Kong. The total number of participants in this observational study included 310 infants and toddlers, 46 teachers and 15 assistant teachers. Half-day centres in the 'play group' mode were excluded from the study because they did not meet the assessment criteria of the ITERS-R (e.g. parents' participation is allowed in the 'play group' mode and there are no meals or naps provided for infants and toddlers). The sample size of the selected centres represented about 35% of the full-time centre-based care services in Hong Kong. Formal invitation letters describing all of the study's features together with consent forms were sent to the supervisors, teachers and parents in these nine centres. Upon receipt of the signed consent forms, a questionnaire survey was administered to collect demographic information on the teachers, infants and toddlers, and other structural features of the classes in these centres. The teachers were asked to provide information on the teacher-child ratio and size of their classes, their qualifications and training, years of experience and demographic information on the infants and toddlers, including their age, sex, ethnicity, home language and problems with language, behavior and disability, if any. The collected questionnaires were coded and processed by statistical means.

Instruments

The Chinese version of the ITERS-R (Harms et al., 2014), adopted in this study, helped us learn about the service quality of centre-based care for infants and toddlers aged zero to two in Hong Kong. The scale consists of 39 items, organised under seven subscales: 'Space and Furnishings', 'Personal Care Routines', 'Listening and Talking', 'Activities', 'Interaction', 'Programme Structure' and 'Parents and Staff'. 'Space and Furnishings' includes items about the indoor space and furniture, provisions for relaxation and comfort and the room arrangement and display for toddlers. 'Personal Care Routines' involves aspects of greeting and departing, meals and snacks, naps, diapering and toileting and health and safety practices. 'Listening and Talking' focuses on the languages and books used in the classroom. 'Activities' covers the toddlers' engagement in fine motor skills, active physical play, art, music, science and nature, blocks, dramatic play, sand and water play, use of video equipment and promotion of acceptance of diversity. 'Interaction' refers to the supervision of play and learning, staff-child interactions, peer interactions and discipline. 'Programme Structure' involves the schedule and structure of the day and provisions for toddlers with disabilities. The 'Parents and Staff' subscale examined the provisions made to address the needs of parents and staff, staff interactions and cooperation, and staff continuity (Harms et al., 2006). The global quality of the selected centres was measured on a 7-point Likert type scale with descriptors from 1 (inadequate), to 3 (minimal), 5 (good) and 7 (excellent) pursuant to the ITERS-R approach.

The scores for 'Parents and Staff' were not included in calculating the mean score for process quality because this aspect was unrelated to the toddlers' everyday experience (Bisceglia et al., 2009; Fenech et al., 2010; Gevers Deynoot-Schaub and Riksen-Walraven, 2005; Tietze and Cryer, 2004; Vermeer et al., 2008). In addition, Items 21 (sand and water play) and 23 (use of TV, video and/or computer) were excluded because they were generally inapplicable to the target sample in this study. The stop-scoring approach was not applied in this research when using the ITERS-R to evaluate the nine centres. Even if a centre could not meet the requirements of the basic items, the researchers still evaluated it with the items belonging to the higher levels. In this way, they could thoroughly understand the strengths and weaknesses of the centres in this study. Apart from collecting the questionnaires, the researchers individually interviewed 19 teachers and they also wrote down what they observed. These additional efforts complemented the ITERS-R scale. For each conceptually defined subscale, the data collected were inputted to calculate the internal consistency coefficients. The Cronbach's alpha coefficients were $\alpha = .92$ and $\alpha = .88$ for the 29 items and all subscales respectively. Compared to the coefficients given in the ITERS-R scoring manual ($\alpha = .93$) (Harms et al., 2006), the Cronbach's alpha was similar to that of the ITERS-R scoring manual at the items' level but lower at the subscales' level. Table 1 shows acceptable levels of internal consistency for all subscales except Programme Structure, ($\alpha = .58$) which should be analysed with caution due to the low α .

Table 1: Cronbach's alpha for the ITERS-R Items and Subscales

	N	Number of items	α
All items*	70	29	.92
All Subscales	70	7	.88
Space and Furnishings	70	5	.65
Personal Care Routines	70	6	.67
Listening and Talking	70	3	.70
Activities*	70	8	.84
Interaction	70	4	.85
Programme Structure*	70	3	.58

Note: *Items 21, 23 and 32 of the ITERS-R Scale are excluded due to missing values.

Training and data collection

Prior to commencing this study, the researcher (the first observer) trained the other observer in the use of ITERS-R. With more than 38 years of experience in the field of early childhood education, the first observer is familiar with childcare policy in Hong Kong. She has been responsible for teacher training and has also been the supervisor of a kindergarten-cum-childcare centre. Combined, this has given her an understanding of how early childhood educational policy has developed and how a childcare centre operates. She has not only been a participant observer, but also a professional interviewer. The second observer completed a Bachelor's degree in Early Childhood Education and has 11 years of relevant experience in early childhood education. The second observer carried out three ITERS-R trial field observations supervised by the first observer after a video training on the use of the ITERS-R tool. A paired sample t-test was used to ensure the inter-observer agreement on observational measurements. Analysis has shown that two observers can achieve statistical agreement on the observational measurements of the study. The two observers visited the different classrooms together, but they scored global quality separately on the ITERS-R scale. The observational measurements lasted for three hours and an interview with teachers was conducted afterward to ensure that sufficient information had been obtained. For each field observation, the two observers had to reach inter-rater agreement on every item. Inter-rater reliability was established to a criterion of 82% agreement within one rating point for two consecutive observations. Accordingly, during the two-day live observation on each classroom, the two observers had to reach consensus on at least 82% of the items to achieve inter-rater reliability. The mean percentage of agreement for the two consecutive observations was 90% (range:84-95%). Double coding was performed twice during the observations to control observer drift.

For the ITERS-R assessments in the nine centres between April 2018 and November 2018, there were 70 observations with two paired observations each time. The weighted Cohen's Kappa, which was applied to the ordinal variables in the measurement, was computed to determine the degree of agreement between the two observers' ratings of the ITERS-R items. Among the 70 observations, 74.29% of the Cohen's Kappa values were above .50 for all items, which represented statistical agreement between the two observers' ratings cores in the ITERS-R measurements.

Findings and Discussions

Research Hypothesis 1:

With the use of ITERS-R measurement, the quality of centre-based care for infants and toddlers is comparable to those countries using the same measurement scale.

The minimal classroom quality in Hong Kong

From the findings shown in Table 1, the quality of centred-based care services in Hong Kong was generally low. The ITERS-R total score for the Hong Kong centre-based care services was 3.09, indicating minimal quality. Among the 70 observations, 52.86% were scored below 3, indicating inadequate quality, and 45.71% were scored between 3 and 5, suggesting minimal quality.

Comparison of different countries and areas

Some Western countries such as Portugal (Barros and Aguiar, 2010), the UK (Karemaker et al., 2012; Melhuish and Gardiner, 2017), North Carolina, US (La Paro et al. 2014), the Netherlands (Helmerhorst et al. 2015) and Norway (Bjørnstad and Os, 2018), have used the ITERS-R as a tool to study the quality of care for infants and

toddlers. The comparison of the childcare quality assessments in Hong Kong and other countries are shown in Table 2.

Table 2: Comparison of Overall ITERS-R Scores among Hong Kong and Other Countries

	Hong Kong N=70 M (SD)	Portugal N=160 M (SD)	Netherlands N = 55 M (SD)	Norway N=206 M (SD)	North Carolina N=93 M (SD)	UK 2012 N = 247 M (SD)	UK 2017 N = 402 M (SD)
Activities	2.03(.94)	2.44(.56)	2.31(.56)	3.5(.77)	4.65(1.29)	3.9 (.90)	4.75 (1.01)
Program Structure	2.68(.81)	2.56(.65)	3.47(1.18)	4.4(1.31)	*	3.6 (1.2)	5.37 (1.24)
Listening and Talking	2.93 (1.13)	3.36(.98)	3.45(1.09)	4.3(1.37)	3.73(1.35)	4.6 (1.1)	5.13 (1.25)
Space and Furnishings	2.99(.88)	3.33(.74)	2.70(.63)	3.8(.09)	4.78(.72)	3.5 (1.0)	5.46 (1.06)
Personal Care Routines	3.72(.93)	1.67(.53)	*	3.5(1.00)	2.53(0.94)	5.1 (1.2)	5.26 (1.15)
Interaction	4.19 (1.15)	3.70 (1.10)	3.81(1.25)	4.7(1.50)	4.43(1.25)	4.5 (1.3)	5.55 (1.14)
Total	3.09 (.77)	2.84 (.48)	2.93(.60)	3.9(.80)	4.37 (.86)	4.0 (.90)	5.25(.99)

Note: *the subscales were excluded in the study.

A comparison of classroom quality of centre-based care services in Hong Kong and other countries indicated that Hong Kong's classroom quality was at the minimal level. However, although Hong Kong had a total score of 3.09, it was higher than that of Portugal (2.84) and the Netherlands (2.93). The quality of infants and toddler care in Portugal and the Netherlands has room for improvement in the area of Interaction and is inadequate in the categories of Activities and Personal Care Routines. On the other hand, the quality of Hong Kong centre-based care services ranked much lower compared to the 2012 and 2017 scores for the UK (4.0 and 5.25 respectively). The scores in Hong Kong were especially low for Space and Furnishings, Listening and Talking, Activities and Programme Structure. Surprisingly, the quality of teacher-child interactions was praised. This result corresponded to the situation in Chile (Cárcamo et al., 2014). The quality of centre-based care services has generally been low and has exhibited great variations (Helburn et al., 1995; Kreader et al., 2005; Phillips et al., 2000; Schmit and Matthews, 2013). The Organisation for Economic Co-operation and Development (OECD) (2018) also highlighted an Australian study in which the process quality measured by the ITERS-R was relatively lower for infants and toddlers than pre-schoolers (Fenech et al., 2010). Childcare environments have often failed to meet the minimum recommendations for structural and process quality even though studies have proven the benefits of high-quality care for toddlers' future development (Mangione et al., 2016). Most child care centres have been categorised as having minimal to less than good process quality. Fenech (2011) suggested that a low ITERS-R score is an indicator, demonstrating the need to acquire information on high-quality care for infants and toddlers.

An on-going study in the UK has witnessed a drastic increase in child care quality, from being 4.00 score in 2012 to 5.25 score in 2017 (Melhuish and Gardiner, 2017). In 2017, the UK obtained high scores for Interaction (M=5.55), Personal Care Routines (M=5.26), and Activities (M=4.75). The rise in UK scores between 2012 and 2017 is probably attributable to the improvement in teachers' and managers' qualifications during this time, and the increasing emphasis on improving the quality of life in the early years, a provision initiated by government measures (Melhuish and Gardiner, 2017). Based on the data collected, it can be concluded that the mean quality of centre-based care in Hong Kong was minimal. Compared with the U.K., North Carolina and Norway, the overall mean for Hong Kong care was significantly lower. However, Hong Kong's quality score was comparable to the European countries of Netherlands and Portugal. The quality assessment framework of ITERS-R may be culturally biased. It stresses the supervision of play and discipline, unlike early childhood education in countries like the United States that do not emphasise these aspects. Our data also indicated inadequacy in other quality aspects. For example, the materials for classroom activities were not enough and the space for physical play, science education, free play and outdoor learning activities were insufficient.

The findings revealed the global quality of Hong Kong centre-based care services and the relative strengths and weaknesses of specific areas in child care compared to the international community. The results from this study demonstrated the applicability of the internationally used ITERS-R tool to measure quality in the new cultural and linguistic environment of Hong Kong. The information derived from the research could help the government and service providers to formulate policies that enhance and improve the quality of centre-based care services in Hong Kong.

Research Hypothesis 2:

Process quality based on the direct interaction of teachers with infants and toddlers, and personal care for infants and toddlers is better than the quality related to the provision and furnishing of learning materials, equipment and space.

Quality of centre-based care services at subscale level

The descriptive statistics of the research findings for the ITERS-R subscales in Hong Kong are presented in Table 3. The average score for the subscales ranged from 2.03 for Activities to 4.19 for Interaction.

Four of the six subscales (Space and Furnishings, Listening and Talking, Activities, Programme Structure) showed average scores below 3, which are at inadequate level, and none were scored at the 'good' level of 5. These results show that Hong Kong faces challenges with the quality of its centre-based care services in general.

Table 3: Quality Scores of Hong Kong Centre-based Care Services at Subscale Level

	N	Mean	SD	Min	Max	Skewness	Kurtosis
Activities*	70	2.03	.94	0.88	5.00	1.53	1.60
Program Structure*	70	2.68	.81	1.00	4.33	-.17	-.40
Listening and Talking	70	2.93	1.13	1.33	5.67	.55	-.33
Space and Furnishings	70	2.99	.88	1.60	5.60	.84	.61
Personal Care Routines	70	3.72	.93	1.67	5.50	-.24	-.82
Interaction	70	4.19	1.15	1.50	6.75	.01	-.08
ITERS-R total score	70	3.09	.77	2.03	4.19	.20	-.35

Note: *Items 21, 23 and 32 of the ITERS-R scale are excluded due to missing values. The subscales are listed in ascending order of mean scores.

The average score for the subscale of Personal Care Routines was higher than that of Space and Furnishings and Activities. That is, the process quality based on the personal care routines for infants and toddlers was better than the quality related to the provision of equipment, furniture and rest space, as well as the learning and play activities. The average scores for the Hong Kong subscales had the same patterns as the UK, Netherlands and Norway, in which the subscale of Interaction scored the highest and the subscale of Activities scored the lowest. The score for the subscale of Personal Care Routines was higher in Hong Kong than most of the other countries because Hong Kong's centre emphasised on hygiene and safety of the care. However, the scores for the subscales of Listening and Talking, and Activities were lower than other countries. The scores for the subscale of Personal Care Routines were at a minimal level in Hong Kong, the UK and Norway. Other scores revealed inadequate levels are: Listening and Talking in Hong Kong; Activities in Hong Kong, Portugal and the Netherlands; and Programme Structure in Hong Kong and Portugal. The skewness and kurtosis values for the subscale of Space and Furnishing and the subscale of Activities in Hong Kong suggest that they were not subject to the normal distribution. These values reflect the concentration of scores for these two subscales on the lower scale points.

Quality of Hong Kong centre-based care services at item level

As shown in Table 4, the quality scores at the item level for the nine centres varied between 1.37 (Item 22 Nature/science) and 5.39 (Item 11 Safety practice). Pursuant to the ITERS-R standard, 15 items scored below 3, indicating poor quality, and 13 items got average scores that fell within the minimal range of 3 to 5. Only one of the 29 items (Item 11 Safety practice) could be characterised as good quality (scored over 5). Sixteen items had a wide distribution, scoring between 1 and 7, which suggests that the quality measured by these items varied among the different classrooms in Hong Kong.

Table 4: Quality Score of Hong Kong Centre-based Care Services at Item Level

	N	Mean	SD	Min	Max	Skewness	Kurtosis
Inadequate							
22. Nature/science	70	1.37	.66	1.00	3.00	1.57	1.12
19. Blocks	70	1.73	1.41	1.00	6.00	2.28	4.18
16. Active physical play	70	1.77	.42	1.00	2.00	-1.32	-0.26
30. Free play	70	1.80	.53	1.00	4.00	0.42	3.51
24. Promoting acceptance of diversity	70	1.83	1.17	1.00	6.00	1.75	3.24
8. Nap	70	1.93	.26	1.00	2.00	-3.40	9.85
14. Using books	70	2.01	1.34	1.00	7.00	-3.40	9.85
18. Music and movement	70	2.06	1.19	1.00	6.00	1.69	2.76
17. Art	70	2.07	1.64	.00	7.00	0.31	-0.34
3. Provision for relaxation & comfort	70	2.34	1.74	1.00	7.00	1.88	2.56
20. Dramatic play	70	2.43	1.68	1.00	7.00	1.32	0.45
1. Indoor space	70	2.87	1.02	1.00	5.00	.84	.61
2. Furniture for routine care & play	70	2.90	1.50	1.00	6.00	-0.07	-1.16
15. Fine motor	70	2.93	2.02	1.00	7.00	1.17	-0.25
4. Room arrangement	70	2.99	1.37	1.00	7.00	0.24	-0.15
Minimal							
31. Group play activities	70	3.06	1.48	1.00	7.00	0.48	-0.02
13. Helping children use language	70	3.13	1.40	1.00	7.00	1.85	3.48
29. Schedule	70	3.17	1.09	1.00	6.00	-0.70	0.13
9. Diapering/toileting	70	3.27	1.62	1.00	7.00	0.55	-0.44
27. Staff-child interaction	70	3.47	1.59	1.00	7.00	0.71	0.43
10. Health practices	70	3.56	1.65	1.00	7.00	0.27	-1.18
6. Greeting/departing	70	3.61	2.19	1.00	7.00	0.60	-1.40
12. Helping children understand language	70	3.66	1.56	1.00	7.00	0.27	-0.81
5. Display for children	70	3.83	.99	1.00	7.00	0.72	3.04
26. Peer interaction	70	4.23	1.48	1.00	7.00	-0.30	-0.59
28. Discipline	70	4.34	1.35	1.00	7.00	-0.62	0.43
7. Meals/snacks	70	4.59	1.60	1.00	7.00	-0.29	-0.85
25. Supervision of play & learning	70	4.70	1.11	2.00	7.00	0.30	-0.44
Good							
11. Safety practice	70	5.39	.97	2.00	7.00	-0.95	1.14

Note: Items 21, 23 and 32 of the ITERS-R Scale are excluded due to missing values. The items are listed in ascending order of mean scores.

In addition to these items, Item 17 (Art) scored zero because this item was inapplicable to some classrooms, and eleven items scored 1. Item 11 (Safety practice) scored 5.39 and Item 25 (Supervision of play and learning) scored 4.70 respectively. Regarding the maximum scores, Items 8 (Nap) and 16 (Active physical play) scored 2; Item 22 (Nature/science) scored 3; Item 30 (Free play) scored 4; Item 1 (Indoor space) scored 5; and Item 2 (Furniture for routine care and play), 18 (Music and movement), 19 (Blocks), 24 (Promoting acceptance of diversity) and 29 (Schedule) scored 6. The maximum score of 2 for naps and active physical play may raise concerns about the consistent poor performance of these two items. The skewness and kurtosis values for items 4, 7, 9, 12, 17, 25, 26 and 31 indicate that these eight items obeyed the normal distribution. Except for Items 4 (Room arrangement) and 17 (Art) with mean scores below 3, the results for the remaining items showed a concentration of scores on the middle scale points.

The highest scores for Interaction

The scores for items in the subscale of Interaction were relatively higher, but the score for Item 27 (Staff-child interaction) was lower than the other items. This may relate to the consistent low scores for Items 12 (Helping toddlers understand language) and 13 (Helping toddlers use language). They show that language plays a significant role in the interaction between teachers and young children.

The focus on health and safety practices in centre-based care services

Compared with other countries, health and safety practices scored higher in Hong Kong. In other environments with higher scores, better health and safety practices were correspondingly observed (Barros and Aguiar, 2010; Bisceglia et al., 2009).

Health practices

Proper hand-washing procedures have been very effective at preventing the transmission of infectious diseases such as respiratory and gastrointestinal illness among groups of young children (Ejemot et al., 2009; Kotch et al., 2007). During the observation, the minimal requirement also appeared to be met for sanitary procedures, and the practices for infants and toddlers' safety met the good level. Minimising the chance for infants and toddlers to become infected is of paramount importance. Otherwise, if their health condition is not satisfactory, they may have poorer social and academic performances than their peers in first grade (Hair et al., 2006). However, similar to Norway (Bjørnstad & Os, 2018), in many Hong Kong childcare centres, it was often inconvenient to wash hands before, during and after diapering, toileting, meals or activities, because there were no wash basins in the classrooms.

Thus, hands were usually washed with alcohol. This is in line with the Bjørnstad & Os's (2018) study in which there was often a lack of hand-washing before or after eating, diapering and toileting in childcare centres. Researchers have assumed that the ITERS-R's strict standards for hand-washing, table-cleaning and diapering explain the low classroom scores (Herrera et al., 2005). High health standards in caregiving practices can reduce the risk of becoming ill (Kotch et al., 2007).

Among these practices, hand-washing and nappy-changing deserve the most attention (Alkon et al., 2009). Directors and observers of childcare centres have often witnessed the improper hand-washing practices of toddlers and staff (Alkon et al., 2010; Cassidy, et al., 2004). For example, teachers generally wash their hands only after changing nappies or using the toilet. Further, according to the data obtained in this study, less than 40% of the teachers cleaned and sanitized the baby changing table every time they used it. In this study, for Item 9 (diapering/toileting), the classrooms in Centres 2,4,5 and 6 had a designated area for nappy changing. In Centres 1 and 3, all classrooms shared a common area for nappy changing and washing hands in warm water. In general, teachers in the centres could follow the proper procedures for changing nappies. For instance, when helping infants and toddlers clean their faeces, the teachers in Centres 2,3,6,7,8 and 9 wore another apron to change nappies that was different from the apron they normally wore. They also wore facemasks and gloves. They moved the infants and toddlers near the sink to wash their hips in warm water. Then they sterilised the changing pad with rubbing alcohol. After carrying out these procedures, the teachers washed their hands. However, because seven of the centres (Centres 2, 3, 4, 5, 7, 8 and 9) did not have washbasins for infants and toddlers, the teachers did not help them wash their hands. For toddlers aged up to 18 months, the teachers only used rubbing alcohol to clean their hands before they ate. To conclude, the teachers in these seven centres adhered to the proper procedures for changing nappies, but they did not help the infants and toddlers wash their hands. Conversely, the classrooms in Centre 6 were equipped with washbasins for toddlers so they could clean their hands. In Centre 8, the teachers helped the infants and toddlers apply face cream after changing their nappies if they needed it. However, the teachers did so before washing their hands. They only washed their hands after completing all the nappy changing steps. Before they helped the infants and toddlers change their nappies, the teachers cleaned the lower part of the infants and toddlers' bodies with wet tissues. In Centres 2,6,7 and 9, the toddlers had to wait on their bed for at least 30 minutes before their nappies could be changed after the afternoon nap. As a result, some toddlers became annoyed and started to cry.

All nine centres had good hygiene standards. At Centre 6, after the exercise of infants and toddlers, the janitor immediately cleaned their toys and mats with alcohol. Afterwards, they cleaned the mats again and put them back. In addition, the janitor cleaned the urinals immediately after use. However, there may have been some constraints in the environment of certain centres. For example, the classrooms in Centre 3 did not have a designated area for hand washing. Therefore, the infants and toddlers could only clean their hands with towels after classroom activities, and they ate directly after that. Instead of hand washing, in some centres rubbing alcohol was relied on to sterilise the environment (Centres 7,8 and 9). In Centre 7, after the toddlers aged 18 to 24 months finished their drawings, the teachers only cleaned their hands with rubbing alcohol before they ate. The same situation existed at Centre 9, especially in the classrooms for toddlers aged 12 to 18 months. Because there were no washbasins in the classrooms, the infants and toddlers only had their hands cleaned with rubbing alcohol before they ate.

Safety practices

All nine centres paid great attention to the infants and toddler's safety. The teachers adequately look after the toddlers to keep them safe. They took preventive measures for foreseeable safety issues. Before any physical activities of using slides, the teachers stayed at the bottom of the slides to avoid accidents. In addition, they always kept an eye on the toddlers playing on the climbing frame and they controlled the number of toddlers playing on the slide to avoid accidents. The gate was always kept closed and the teachers made sure that the toddlers remained in the designated safe areas. During the interview, the teachers mentioned that the infants and toddler's safety was always their first priority. Even when some teachers were absent, the remaining teachers did their utmost to keep the infants and toddlers safe. All these measures showed that the Hong Kong centres focused on infants and toddlers' safety. The above findings differ from that of the Bjørnstad and Os's (2018) study in which the teachers did not provide enough supervision on the toddlers, especially during naptime and play, failing to fulfil the related requirements. Bjørnstad and Os observed that some toddlers even played without supervision for up to 20 minutes.

Provision and furnishing of learning materials, equipment and space

After observing the classroom environment in the nine centres, it was understood that the teachers in all centres carried out similar preparation works for the infants and toddlers' nap. The janitor swept the floor and put away the large furniture such as the toddlers' desks, chairs and toy cupboards. Then, they placed nylon beds in the classroom for the infants and toddlers. Three centres (Centres 2, 4 and 7) needed to use the same room for exercising and napping. Because of the preparation and finishing works for the toddlers' nap, the scores for Item 3 (Provision for relaxation and comfort), Item 14 (Using books), Items 30 (Free play) and 31 (Group play activities) could have been affected. After the nap time, the janitor restored furniture and other settings inside the room.

Seven of the centres set up a comfort zone in the classroom. Infants younger than one year old could crawl and do some quiet activities in the comfort zone. Toddlers older than one could also read in that zone. Sometimes the teachers also carried out teaching activities in the comfort zone. Centre 3 had plenty of soft toys that the infants and toddlers could use most of the time, whereas the soft toys in the other eight centres were only used for teaching purposes. The toddlers in the eight centres could not play with the toys by themselves and they could not be allowed to access more than three soft toys most of the time. The classrooms in Centres 1, 2, 5, 6, 7, 8 and 9 did not have a book corner. The teachers were responsible for distributing books to the toddlers and they did not allow the toddlers to get access to the books. In Centre 4, there was a book corner in the classrooms designated for toddlers aged 18 to 24 months. However, there were only a few books and the books were old. Each child could only have one book at a time. Only the classrooms in Centre 3 had book corners with enough books so that every child could have at least two books. In the other seven centres, each child could only have one book or none. These findings are in line with that of Bjørnstad and Os (2018), who observed low scores for the items under the subscale of Activities. The surprisingly low scores were mainly linked to the toddlers' minimal access to toys and materials. Vermeer et al. (2008) also suggested that classrooms in the Netherlands had low ITERS-R scores on the Activities subscale due to their emphasis on learning and playing materials.

Research Hypothesis 3:

The global quality of infant and toddler care is positively associated with the teachers' qualifications. Specifically, we hypothesise that the higher the teachers' qualifications, the higher the quality of centre-based care services.

Inter-correlations between process quality and teachers' variables

To investigate the association between the process quality of centre-based care services in Hong Kong and the teachers' variables (i.e. age, years of service, years of service in current centre, qualifications and wages), correlation analysis at the overall, subscale and item level was conducted. All teacher variables included in the correlation analysis and standard multiple regression analysis were normally distributed interval variables, except for the qualification that covered 'Certificate in Child Care Course', 'Qualified Kindergarten Teacher Course', 'Certificate in Early Childhood Education/Higher Diploma in Early Childhood Education', 'Bachelor of Education (Honours) in Early Childhood Education/Bachelor of Arts (Honours) in Pre-primary Education' and 'Other degrees'. Each sub-variable was coded '1' for obtaining the qualification and '0' for not having the qualification. For descriptive purposes, Table 6 shows the correlation coefficients between the quality of centre-based care and the teachers' variables.

It reveals that overall the centres' quality was negatively correlated with 'Experience in current centres' ($p < .05$), but positively correlated with 'Qualified Kindergarten Teacher Course' and 'Bachelor of Education (Honours) in Early Childhood Education/Bachelor of Arts (Honours) in Pre-primary Education' ($p < .05$). The correlation coefficients were $-.63$, $.66$ and $.65$ respectively. Based on the correlation analysis, the standard multiple regression analysis were used for further analysis.

Table 5: Inter-correlations between the quality of childcare centres and the teachers' variables

	1	2	3	4	5	6	7	8	9	10
1. Crèche quality	1									
2. Age	.32	1								
3. Experience	-.11	.81**	1							
4. Experience in current crèche	-.63*	.78**	.70*	1						
5. Certificate in Child Care Course	-.47	.56	.33	.37	1					
6. Qualified Kindergarten Teacher Course	.66*	-.07	.21	-.39	-.33	1				
7. Certificate in Early Childhood Education / Higher Diploma in Early Childhood Education	.11	-.36	-.12	-.06	-.01	-.22	1			
8. Bachelor of Education (Honours) in Early Childhood Education/ Bachelor of Arts (Honours) in Pre-primary Education	.65*	-.26	-.11	-.38	-.06	.39	.67*	1		
9. Other degrees	.46	-.23	-.08	-.41	-.43	.50	-.54	-.22	1	
10. Compensation	-.08	.38	.42	.51	-.44	.21	-.48	-.41	.16	1

** $p < .01$ * $p < .05$

Regression analysis for teachers' variables predicting the quality of childcare centres

Table 6: Regression Analysis for Teachers' Variables Predicting the Quality of Childcare Centre (N=9)

Variable	Quality of Childcare Centre				
	B	SE B	β	r_s	p
Experience in current crèche	-.37	.30	-.34	-.63*	.034
Qualified Kindergarten Teacher Course	1.56	1.10	.39	.62*	.038
Bachelor of Education (Honours) in Early Childhood Education/Bachelor of Arts (Honours) in Pre-primary	1.20	.87	.37	.35	.178

* $p < .05$

The regression results (see Table 6) indicate that no statistically significant predictor was found for centre-based care quality for infants and toddlers. However, according to the results of Spearman's correlations, there was a small statistically significant negative correlation between centre-based care quality and 'Experience in current centres' ($r_s = -.63$, $p = .034$), and a small statistically significant positive correlation between centre-based care quality and 'Qualified Kindergarten Teacher Course' ($r_s = .62$, $p = .038$). There was also a trend toward a positive association between centre-based care quality and 'Bachelor of Education (Honours) in Early Childhood Education/Bachelor of Arts (Honours) in Pre-primary' ($r_s = .35$, $p = .178$). These results suggest that the quality of a childcare centre was higher with higher qualifications and less experience of teachers.

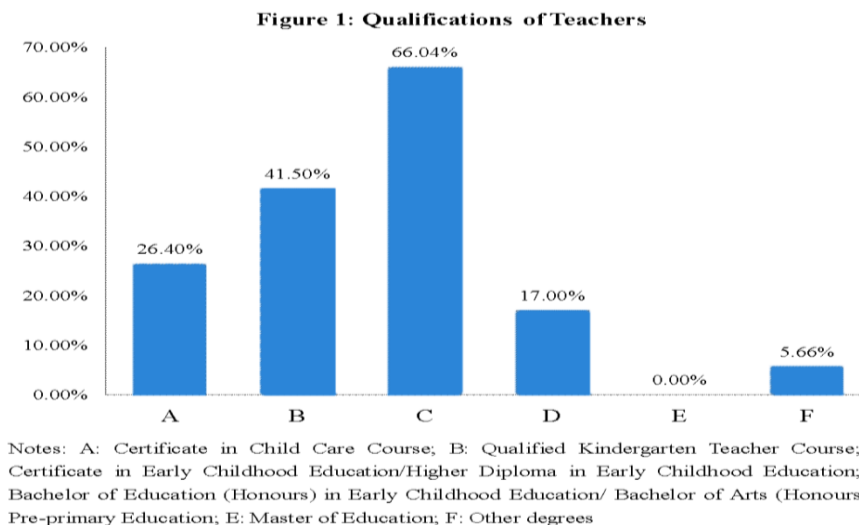


Figure 1 shows that most of the teachers in the nine childcare centres did not achieve a high level of education, such as a Bachelor's degree or above. Over 60% of the teachers had a Certificate in Early Childhood Education/Higher Diploma in Early Childhood Education. The ratio for having taken a Qualified Kindergarten Teacher Course and a Certificate in Child Care Course was 41.5% and 26.4% respectively.

However, the percentage of those with a Bachelor's degree in early childhood education/pre-primary education was just 17%, and 5.66% of the teachers had other degrees, such as a Post Graduate Diploma in Education.

Teacher's education and experience

The Certificate in Child Care course, Qualified Kindergarten Teacher course and Certificate in Early Childhood Education/Higher Diploma in Early Childhood Education provide basic training for teachers and should help improve the quality of centre-based care services. In this study, most of the teachers did not have a higher qualification, such as a Bachelor's degree, so it can be assumed that the minimal overall quality of centre-based classrooms might have been related to the lack of more professional teacher training. However, it was quite surprising to learn that the current centres having teachers with more experience resulted in worse centre-based care services. In the international context, teacher education has been viewed as an essential structural quality feature. Research in a range of countries has also suggested that teacher education and childcare quality are interrelated (e.g. NICHD ECCRN, 2002; Vandell and Wolfe, 2000). Some research studies on teacher education have found a positive correlation between a teacher's education level and the quality of teacher-child interactions (Kelley & Camilli, 2007; La Paro et al., 2009). Conversely, teacher experience and classroom quality and young children's learning outcomes have not been strongly related. Teachers' educational levels and the training they receive are structural features that play an indispensable role in the quality of centre-based care services. There is no doubt that teachers who have received better education and training can provide a higher quality of care for infants and toddlers, compared to those who have received relatively less (La Paro et al., 2009; OECD, 2012).

Recommendations

Increasing expenditure on childcare services

Because every child in this study only had 2.8 square meters of space on average in a childcare centre, the activity room had to serve different purposes at different times. Teachers had to change the setting of the room multiple times every day and this affected the usage of the facilities. Due to the limited space, the separated width of naptime beds was less than 36 inches and there were only a small number of books, toys, building blocks and washbasins. It is suggested that the government should increase the space and resources allocated to childcare centres. As expected, the mean level of quality for Hong Kong centre-based care services was lower than that of the Western countries on average. This is probably the result of the insufficient expenditure on early childhood education every year, which has been one of the lowest among the OECD countries. Hong Kong has only spent a little more than half of the average annual expenditure of other OECD countries (OECD, 2012).

The study of Yip et al.(2018) indicated that, compared with Sweden, Finland, Australia, South Korea and Singapore, Hong Kong had the lowest expenditure as a percentage of GDP and known government spending. Among the five jurisdictions in the Yip's study, the percentage of GDP expenditure on early childhood education was only 0.19% in Hong Kong, with only 0.13% spent on pre-primary education and 0.06% on childcare services. The percentage for early childhood education in Hong Kong's total government spending only occupied 2%. From 2013 to 2018, the percentage of spending on pre-primary education/services in terms of GDP was 0.26%. In the current Hong Kong situation, the expenditure on kindergarten education is about three times the spending on centre-based care services for infants and toddlers.

Professional development of teachers

The findings on Hong Kong suggest that teachers with different work experience and qualifications have different impacts on different items in the ITERS-R. This is a possible direction for further in-depth research. Although the results of this study reflect the situation in Hong Kong, they may arouse global awareness because centre-based care quality assessments of centre-based care services have been rare in Asia. Through this study, people can understand that the quality of care is affected by professional education of teachers. The quality of care for infants and toddlers should also be considered in its own national and cultural context of teacher education.

Limitations

There were some constraints on this study. First, because the participating childcare centres volunteered to participate in the research rather than being randomly selected by the researcher, the sample might not be representative. In addition, the ITERS-R scale might be culturally biased despite its widespread use. For instance, the emphasis on aspects such as hygienic routines and playing outside might not be applicable to all regions.

Given that only the ITERS-R was used to assess the quality of the infant and toddler care environment, the generalizability of the findings is limited. Less information can be extracted from a single quality measurement tool and hence fewer deductions can be made. Therefore, it is suggested that more quality assessment tools for childcare services should be used in future research.

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References

- Alkon, A., Bernzweig, J., To, K., Wolff, M., & Mackie, J. (2009). Child care health consultation improves health and safety policies and practices. *Academic Pediatrics*, 9, 366-370. doi:10.1016/j.acap.2009.05.005
- Alkon, A., To, K., Mackie, J., Wolff, M., & Bernzweig, J. (2010). Health and safety needs in early care and education programs: What do directors, child healthy records, and national standards tell us? *Public Health Nursing*, 27(1), 3-16. doi:10.1111/j.1525-1446.2009.00821.x
- Barros, S., & Aguiar, C. (2010). Assessing the quality of Portuguese child care programs for toddlers. *Early Childhood Research Quarterly*, 25, 527-535. doi:10.1016/j.ecresq.2009.12.003
- Bisceglia, R., Perlman, M., Schaack, D., & Jenkins, J. (2009). Examining the psychometric properties of the Infant-Toddler Environment Rating Scale-Revised edition in a high-stakes context. *Early Childhood Research Quarterly*, 24, 121-132. doi:10.1016/j.ecresq.2009.02.001
- Bjørnstad, E., Pramling Samuelsson, I., Bae, B., Gulbrandsen, L., Johansson, J.-E., Løberg, H., & Os, E. (2012). *Hvabetyrlivet i barnehagen for barn under 3 år? En forskningsoversikt. [What does life in day care mean for children under the age of three years? A research review].* (Vol. 2012 nr. 9). Oslo: Høgskoleni Oslo og Akershus.
- Bjørnstad, E., and Os, E., (2018). Quality in Norwegian childcare for toddlers using ITERS-R, *EECERJ* 26 (1), 1-23.
- Burchinal, M., Cryer, D., Clifford, R., & Howes, C. (2002). Caregiver training and classroom quality in child care centres. *Applied Developmental Science*, 6, 2-11. doi: 10.1207/S1532480XADS0601_01
- Cárcamo, Rodrigo A., Veer, René van deer, & Ijzendoorn, Marinus H. Van (2014). *Child and youth Care Forum*, 43(6), 747-761.

- Campbell, P. H., & Milbourne, S. A. (2005). Improving the quality of infant-toddler care through professional development. *Topics in Early Childhood Special Education*, 25, 3-14. doi:10.1177/02711214050250010101
- Cassidy, D., Hestenes, S., Hestenes, L., & Mims, S. (2004). Lessons learned from the first three years of the North Carolina star rated license assessments. Paper presented at National Smart Start Conference, Greensboro, NC.
- Clarke-Stewart, A., & Allhusen, V. D. (2005). *What we know about childcare*. Cambridge, MA: Harvard University Press.
- Cryer, D., Tietze, W., Burchinal, M., Leal, T., & Palacios, J. (1999). Prediction process quality from structural quality in preschool programs: A cross-classroom comparison. *Early Childhood Research Quarterly*, 14, 339-361.
- Ejemot, R. I., Ehiri, J.E., Meremikwu, M. M., & Critchley, J. A. (2009). Hand washing promotion for preventing diarrhoea (review). *Evidence-Bases Child Health: A Cochrane Review Journal*, 4, 893-939. doi:10.1002/ebch.351
- Fenech, M., Sweller, N., Harrison, L. (2010). Identifying high-quality centre-based childcare using quantitative datasets: what the numbers do and don't tell us. *International Journal of Early Years Education*, 18, 283-296, doi: 10.1080/09669760.2010.531615
- Fenech, M. (2011). An analysis of the conceptualisation of 'Quality' in early childhood education and care empirical research: promoting 'blind spots' as foci for future research. *Contemporary Issues in Early Childhood*, 12 (2), 102-117.
- Gevers Deynoot-Schaub, M.J.J.M., & Riksen-Walraven, J.M.A. (2005). Child care under pressure: The quality of Dutch centers in 1995 and 2001. *The Journal of Genetic Psychology*, 66, 280-296.
- Hair, E., Halle, T., Terry-Humen, E., Lavelle, B., & Calkins, J. (2006). Children's school readiness in the ECLS-K: predictions to academic, health, and social outcomes in first grade. *Early Childhood Research Quarterly*, 21, 431-454. doi:10.1016/j.ecresq.2006.09.005
- Hallam, R., Fouts, H., Bargreen, K., & Caudle, L. (2009). Quality from a toddler's perspective : A bottom-up examination of classroom experiences. *Early Childhood Research & Practice*, 11(2). Retrieved from <http://www.freepatentspm;ome.com/articel/Early Childhood Research -Practice/214892837.html>
- Harms, T., Cryer, D., & Clifford, R. M. (2003). *Infant/toddler environment rating scale-revised edition*. New York, NY: Teachers College Press.
- Harms, T., Cryer, D., & Clifford, R. M. (2006). *Infant/toddler environment rating scale-revised edition*. New York, NY: Teachers College Press.
- Harms, T., Cryer, D., & Clifford, R. M. (2014). *Infant/toddler environment rating scale-revised* (Wang, G. H., & Zhou, Y. (Trans.)). Hong Kong: PECERA.
- Heblburn, S., Culkin, M. L., Morris, J., Mocan, N., Howes, C., Phillipsen, L. C., & Rusticity, J. (1995). Cost, quality, and child outcomes in child care centers: Executive summary. Denver, CO: University of Colorado at Denver.
- Helmerhorst, K. O. W., Riksen-Walraven, J. M. A., Deynoot-Schaub, M. J. G., & Fukkink, R. G. (2015). Child care quality in the Netherlands over the years: A closer look. *Early Education & Development*, 26(1), 89-105. doi:10.1080/10409289.2014.948784
- Herrera, M. O., Mathiesen, M. E., Merino, J. M., & Recart, I. (2005). Learning contexts for young children in Chile: Process quality assessment in preschool centres. *International Journal of Early Years Education*, 13(1), 13 – 27. doi:10.1080/09669760500048253
- Hong Kong Education Bureau & Social Welfare Department. (2019). *Operation Manual for Pre-primary Institutions*. Retrieved from <http://www.edb.gov.hk/index.aspx?nodeID=175&langno=1>
- Hong Kong Social Welfare Department. (2019). *Child care services*. Retrieved from http://www.swd.gov.hk/en/index/site_pubsvc/page_family/sub_listofserv/id_childcares/
- Karemaker, A., Mathers, S., and Singer, R. (2012). *Improving quality in the early years: A comparison of perspectives and measures*. Technical report. Oxford: Daycare Trust and University of Oxford.
- Kelley, P., & Camilli, G. (2007). *The impact of teacher education on outcomes in center-based early childhood education programs: A meta-analysis*. Retrieved from <http://nieer.org/research-report/the-impact-of-teacher-education-on-outcomes-in-center-based-early-childhood-education-programs-a-meta-analysis>

- Kotch, J.B., Isbell, P., Weber, D.J., Nguyen, V., Savage, E., Gunn, E., & Allen, J. (2007). Hand washing and diapering equipment reduce disease among children in out-of-home child care centers. *Pediatrics*, 120(1), 29-36. doi:10.1542/peds.2005-0760
- Kreader, J. L., Ferguson, D., & Lawrence, S. (2005). *Infant and toddler child care quality*. Alhambra, CA: National Center for Children In Poverty.
- La Paro, K. M., Hamre, B. K., Locasale-Crouch, J., Pianta, R. C., Bryant, D., Early, D., Burchinal, M. (2009). Quality in kindergarten classrooms: Observational evidence for the need to increase children's learning opportunities in early education classrooms. *Early Education and Development*, 20(4), 657-692.
- La Paro, K.M., Williamson, A.C., & Hatfield, B. (2014). Assessing quality in toddler classrooms using the CLASS-Toddler and the ITERS-R. *Early Education and Development*, 25, 875-893.
- Mangione, P. L., Kriener-Althen, K., & Marcella, J. (2016) Measuring the multifaceted nature of infant and toddler care quality, *Early Education and Development*, 27(2), 149-169, doi:10.1080/10409289.2016.1088314
- Melhuish, E., & Gardiner, J., (2017). *Study of early education and development (SEED): Study of quality of early years provision in England*. London: Department for Education.
- Ministry of Education and Research (2016). *Melt. St. White paper 19.2015-2016. Tid for likogl ering: Bedreinnhold I barnehagen [Time for play and learning : Better content in kindergarten]*. Oslo, Norway.
- National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN]. (2002). Child-care structure -process -outcome: direct and indirect effects of child-care quality on young children's development. *Psychological Science*, 13,199-206.
- Organization for Economic Co-operation and Development (OECD). (2012). *Starting Strong III: A quality toolbox for early childhood education and care*, OECD Publishing, Paris, doi.10.1787/9789264123564-en.
- Organization for Economic Co-operation and Development (OECD). (2015). *Starting Strong IV: Monitoring quality in early childhood education and care*. OECD Publishing, Paris.
- Organization for Economic Co-operation and Development (OECD). (2018), *Engaging young children, lessons from research about quality in early childhood education and care*, Starting Strong, OECD. Retrieved from: https://books.google.com.hk/books?id=oDVTdWAAQBAJ&pg=PA42&lpg=PA42&dq=isced01&source=bl&ots=K4XLL_XdiO&sig=Vj2W6zSM_aTVqc_49DhY5W8SEAc&hl=en&sa=X&ved=2%20ahUKEwju pyRsIreAhXIgbwKHczFBFMQ6AEwCHoECAIQAQ#v=onepage&q&f=true
- Perlman, M., Zellman, G. L., & Vi-Nhuan, L., (2004). Examining the psychometric properties of the Early Childhood Environment Rating Scale-Revised (ECERS-R). *Early Childhood Research Quarterly* 19:398-412.
- Phillips, D., Mekos, D., Scarr, S., McCartney, K., & Abbott-Shim, M. (2000). Within and beyond the classroom door: Assessing quality in child care centers. *Early Childhood Research Quarterly*, 15, 475-496. doi:10.1016/S0885-2006(01)00077-1
- Schmit, S., & Matthews, H. (2013). *Better for babies: A study of state infant and toddler child care policies*. Washington, DC: Center for Law and Social Policy.
- Tietze, W., & Cryer, D. (2004). Comparisons of observed process quality in German and American infant/toddler programs. *International Journal of Early Years Education*, 12 (1), 43-62.
- Vandell, D. L., & Wolfe, B. (2000). *Child care quality: Does it matter and does it need to be improved?* Washington: Institute for Research on Poverty. University of Wisconsin-Madison. Retrieved from <http://aspe.os.dhhs.gov/hsp/ccquality00/ccqual.htm>
- Vandell, D.B. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly*, 50, 387-414.
- Vermeer, H. J., Van IJzendoorn, M.H., De Kruif, R.E.L., Fukink, R. G., Tavecchio, L.W.C., Riksen-Walraven, J.M.A., & Van Zeijl, J. (2008). Child care in the Netherlands: Trends in quality over the years 1995-2005. *The Journal of Genetic Psychology*, 169, 360-385.
- Yip, P. S. F., Chan, C. H., Law, F., Guo, Y., Jordan, L., and Xiong, C. (2018). *Consultancy study on the long-term development of child care services*. The University of Hong Kong.